

CLAIMS

1. An electrode pad on a conductive semiconductor substrate comprising:

a conductive substrate;

5 an insulating material film formed on the conductive substrate;

an electrode pad formed on the insulating material film; and

10 a wiring electrode formed on said insulating material film, connected to said electrode pad, and having a width different from that of said electrode pad,

wherein the size of said electrode pad is substantially equal to or greater than the size of a part of electrical connection to an external device, and a  
15 first thickness of a first region of said insulating material film on which at least said electrode pad is formed is different from a second thickness of a second region of said insulating material film on which at least part of said wiring electrode is formed and which is a  
20 region other than said first region so that a characteristic impedance of said electrode pad is almost matching with a characteristic impedance of the external device connected to said electrode pad.

25 2. The electrode pad on the conductive semiconductor substrate according to claim 1, wherein the width of said wiring electrode is smaller than the size of said electrode

pad, and the first thickness of said first region of said insulating material film is greater than the second thickness of said second region of said insulating material film.

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3. The electrode pad on the conductive semiconductor substrate according to claim 2, wherein said insulating material film has a protruding portion in which said first region protrudes to the surface side.

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4. The electrode pad on the conductive semiconductor substrate according to claim 3, wherein a sidewall surface of said protruding portion is inclined.

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5. The electrode pad on the conductive semiconductor substrate according to claim 4, wherein said electrode pad is positioned on the upper surface of said protruding portion, and

said wiring electrode placed along the surface of said insulating material film is connected to said electrode pad, and a portion placed on said inclined side wall surface in the placed wiring electrode has a plane taper shape in which the width increases as the thickness up to said semiconductor substrate below the wiring electrode increases.

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6. The electrode pad on the conductive semiconductor substrate according to claim 5, wherein a rate of change in the taper width of portion having a taper shape in said wiring electrode and/or an angle of inclination of said inclined side wall surface are adjusted so that the characteristic impedances of said electrode pad and said wiring electrode are substantially 50 ohms.

7. The electrode pad on the conductive semiconductor substrate according to claim 6, wherein the width of the wiring electrode formed on said second region and said second thickness are adjusted so that the characteristic impedance of the wiring electrode formed on said second region is almost consistent with the characteristic impedance of said electrode pad.

8. The electrode pad on the conductive semiconductor substrate according to claim 2, wherein a trench portion is formed on said conductive substrate, and  
a part of the first region of said insulating material film is formed in said trench portion so that an interval between the bottom surface of said trench portion and said electrode pad equals said first thickness.

9. The electrode pad on the conductive semiconductor substrate according to claim 8, wherein the surface of said insulating material film is substantially flat.

10. The electrode pad on the conductive semiconductor substrate according to claim 9, wherein the side wall surface of said trench portion is inclined to the extent  
5 that an angle formed with the bottom surface of the trench portion is greater than the right angle.

11. The electrode pad on the conductive semiconductor substrate according to claim 10, wherein said electrode  
10 pad is positioned above the bottom surface of said trench portion, and

said wiring electrode placed along the surface of said insulating material film is connected to said electrode pad, and a portion positioned above said  
15 inclined side wall surface in the wiring electrode has a plane taper shape in which the width increases as the depth to said semiconductor substrate below said wiring electrode increases.

20 12. The electrode pad on the conductive semiconductor substrate according to claim 11, wherein a rate of change in the taper width of portion having a taper shape in said wiring electrode and/or an angle of inclination of said inclined side wall surface are adjusted so that the  
25 characteristic impedances of said electrode pad and said wiring electrode are substantially 50 ohms.

13. The electrode pad on the conductive semiconductor substrate according to claim 12, wherein the width of the wiring electrode formed on said second region and said second thickness are adjusted so that the  
5 characteristic impedance of the wiring electrode formed on said second region is almost matching with the characteristic impedance of said electrode pad.

14. The electrode pad on the conductive semiconductor  
10 substrate according to claim 1, wherein said first thickness is set according to the size of said electrode pad and the characteristic impedance of said external device.

15 15. The electrode pad on the conductive semiconductor substrate according to claim 1, wherein the size of said electrode pad is 30  $\mu\text{m}$  or greater.

16. The electrode pad on the conductive semiconductor  
20 substrate according to claim 1, wherein the characteristic impedance of said electrode pad is substantially 40 ohms.

17. The electrode pad on the conductive semiconductor  
25 substrate according to claim 1, wherein the characteristic impedance of said electrode pad is substantially 50 ohms.

18. The electrode pad on the conductive semiconductor substrate according to claim 1, wherein said wiring electrode is connected to an optical device element.

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19. The electrode pad on the conductive semiconductor substrate according to claim 1, wherein said wiring electrode is connected to an electronic device element.

10 20. The electrode pad on the conductive semiconductor substrate according to claim 1, wherein said electrode pad is formed on the end of the conductive substrate.